"Ryan, Stephen" <Steve.Ryan@WestonSolutions.com>

To

Subject North Mallard Lake- LFG to energy systems

04/13/2009 06:21 PM

History: This message has been replied to and forwarded.

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Steve & Wally;

Attached is a spec sheet on Capstones smallest Microturbine, 30 KW. These have been used on a variety of landfills and only need about 15-30 cfm each of approximately 30% methane (or greater) LFG to produce electricity. The LFG does need to be conditioned first to remove siloxanes and other gasses prior to combustion in the turbine. These are the type of turbines installed at Antioch High School that use about 150 -180 cfm of LFG from HOD landfill superfund site in Antioch, IL. They have also been used at the Sauk County Landfill in Wisconsin to produce the equivalent of electrical power for 150 homes from about 180 cfm of LFG with 12 microturbines.

Another possibility would be using mobile IC units to run generators. Pro-Act (the guys that are renting to STS/BFI) says that they have a couple units that are fitted with small generators and that they can outfit any IC unit with a generator.

Whether or not NML has enough LFG capacity to make it commercially viable to produce electricity is unknown at this time. It is an old fill, however, much of the waste is submerged which greatly slows down the biodegradation processes that produce LFG and may cause NML to produce gas for a much longer time at lower rates than a typical landfill. Further assessment of the LFG quality and quantity would be required to determine how much gas it is currently producing.

Let me know if you would like any further information.

Regards,

Steve Ryan
847-918-4131

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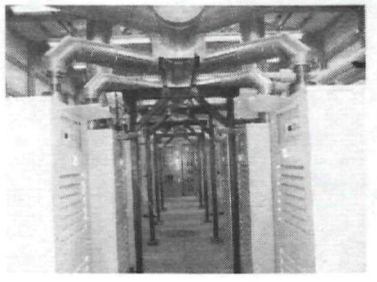
Landfill Gas-to-Energy Project
HOD Landfill and Antioch Community High School



The HOD Landfill (the site) is located within the eastern boundary of the Village of Antioch in Lake County in northeastern Illinois. The closed 51-acre municipal and industrial solid waste disposal facility was active from 1963 to 1984. During that time, the landfill accepted approximately 2 million tons of waste.

On September 28, 1998, the United States Environmental Protection Agency (USEPA) issued a Record of Decision (ROD) for the site, with concurrence from the Illinois Environmental Protection Agency (IEPA). The ROD required specific landfill closure activities to be performed. The Final Remedial Design included a landfill gas and leachate management system and improved final cover. Operation of the gas and leachate management system began on April 3, 2001, including the monitoring of gas flow rates and characteristics.

A Valuable Lesson

Never did Antioch Community High School think that residing next to this landfill would be an advantage. Then they found themselves becoming the first school district in the U.S. to get electricity and heat from landfill gas.

In 2002, RMT, Inc. (RMT), an environmental engineering, consulting, and construction management firm, entered into a contract with the Antioch Community High School to turn landfill gas produced by the nearby HOD closed landfill into energy for use by the school, which is located approximately one-half mile from the landfill. RMT led the design and construction of this landfill gas-to-energy project, which includes a 360-kilowatt (kW) microturbine plant that will be powered by landfill gas that is currently collected from the nearby landfill. This energy will, in turn, be used to heat and power the school. "We're going to be able to recycle, save money for the taxpayers, and help with the environment," says Bill Ahlers, business manager for Antioch Community School District 117.

The Grant that Made It Happen

The overall cost of the project was estimated at $1.9 million. According to Mark Torresani, RMT project manager, there were a few things that made this project possible. RMT completed a grant application on behalf of the Antioch School District for submittal to the Illinois Department of Commerce and Economic Opportunity (formerly knows as Illinois Department of Commerce and Community Affairs) in April 2002, who then awarded Antioch Community High School a $550,000 grant from the state's Renewable Energy Resources Program (RERP) to design and construct the facility. The school district funded the rest by issuing a revenue bond.

The Science

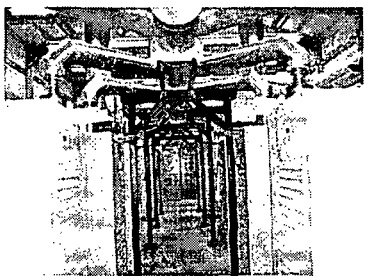
How does this whole thing work? As soon as waste is deposited, bacteria begin the decomposition process. Decomposition can occur either anaerobically (without oxygen) or aerobically (with oxygen). Anaerobic decomposition is a biochemical reaction that produces methane and carbon dioxide, both "greenhouse" gases, also known as "biogas". Typically, biogas is 50-60% methane. It is methane that makes the landfill gas a suitable fuel.

Putting It to Work

One-half mile of piping carries the gas from the landfill to 12 Capstone MicroTurbines™ located on the school property. The energy recovered from the microturbines, which were developed by Capstone Turbine Corporation and installed by Unison Solutions, will be used to heat and power the 262,000 square-foot school building.

Each Capstone MicroTurbine™ generates 30 kW of electricity for a combined total of 360kW. The planned system will produce enough power to satisfy demand for the equivalent of 120 homes. Generated electricity will be used at the school, and any extra electricity will be sold to Com Ed.

Landfill Gas-to Energy Project - *cont.*



Each microturbine also produces exhaust energy of 290,000 Btu/hr at 550°F. The exhaust from the microturbines is routed through a waste heat recovery system. The waste heat recovery units have been designed for maximum flexibility, so, by varying flow and inlet fluid temperature, a wide variety of needs can be met for hot water.

Generating the Heat

At times when waste heat recovery is not required by the Antioch Community High School, the exhaust can be automatically diverted around the exchanger, allowing for continued electrical output. During months when the Antioch Community High School cannot use all of the heat from the waste heat recovery system, it is possible to route some of this heat to other area businesses or industries.

Teaming Up

This project is a prime example of how innovative partnerships and programs create win-win situations. The team of key players includes RMT, HOD Landfill, Antioch Community High School, Village of Antioch, Illinois Department of Commerce and Economic Opportunity, Com Ed, and the USEPA. RMT continues to work with local government, school officials, and the USEPA, in addition to managing the ongoing construction activities. These activities include hiring subcontractors to install equipment such as the microturbines and extension of pipes from the landfill to the school, and providing community relations services.

A Win-Win Situation

After months of planning, installing equipment, and testing, Antioch Community School District 117 and RMT have completed this landfill gas-to-energy project, setting the high school on track to be one of the first in the country to use landfill gas for heat and electrical production. Both the school and the community are seeing multiple rewards:

- Low energy costs for the high school
- Revenue from sale of electricity to Com Ed
- Clean, complete combustion of waste gas
- Waste heat for internal use in the high school
- Reduced greenhouse gas emissions
- Public relations opportunities for Antioch Community High School and the community as the first school district in the U.S. to get electricity and heat from landfill gas
- Education opportunities in biology, physics, chemistry, economics, and environmental management as a result of this on-campus, state-of-the art gas-to-energy system

Torresani explains, "The project is truly unique and will make the most of a valuable energy resource. Starting in the 2003 school year, the annual savings to the school in energy costs are anticipated to be over $100,000 a year. The school, its students, the community, the public, and the environment all benefit."

For more information on this landfill gas-to-energy project, contact Mark Torresani in RMT's Madison office at 608/831-4444 or visit www.rmtinc.com.